CLAIMS

What is claimed is:

1. A system for assessing the transmission of light between a first optical fiber and a second optical fiber associated therewith, said system comprising:

a) a light injector having an injector base attachable to a substrate, and comprising:

(i) an injector cover, at least a portion of which is slidably movable in a plane parallel to said injector base, said movable portion having an open position and a closed position, the open position permitting insertion of said first fiber into said injector;

(ii) an injector window having an entry face and a concave, arcuate exit face;

(iii) an injector mandrel having a shape complementary to that of said exit face of said injector window, and being biased to clasp a portion of said first optical fiber in intimate contact between said injector mandrel and said exit face of said injector window, said injector mandrel being reversibly retractable from said exit face in response to motion of said injector cover from the closed position to the open position thereof;

(iv) a light source positioned proximate said entry face of said injector window, whereby light emanating from said source passes through said injector window into said first fiber at said exit face; and

(v) said first fiber entering said injector in an entry direction and emerging from said injector in an exit direction, said entry and exit directions being substantially parallel, and said first fiber traversing a path through said injector substantially in a plane parallel to said injector base;

b) A light detector having a detector base attachable to said substrate and comprising:

(i) an detector cover, at least a portion of which is slidably movable in a plane parallel to said detector base, said movable portion having an open position and a closed position, the open position permitting insertion of said second fiber into said detector;

(ii) a detector window having a concave, arcuate entry face and an exit face;

(iii) a detector mandrel having a shape complementary to that of said entry face of said detector window, said detector mandrel being biased to clasp a portion of said second optical fiber in intimate contact between said detector mandrel and said entry face of said detector window, and said detector mandrel being reversibly retractable from said entry face in response to motion of said detector cover from the closed position to the open position thereof;

(iv) a light responsive element to detect light emerging from said fiber, said light responsive element being positioned proximate said exit face, whereby light emanating from said fiber at said

entry face passes through said detector window into said light responsive element; and

(v) said second fiber entering said detector in an entry direction and emerging from said detector in an exit direction, said entry and exit directions being substantially parallel, and said second fiber traversing a path through said detector substantially in a plane parallel to said detector base;

c) a driver operably connected to energize said light source; and

d) a receiver for determining the intensity of light incident on said light responsive element.

2. A system as recited by claim 1, wherein each of said first and second optical fibers comprises a core, a cladding, and a buffer.

3. A system as recited by claim 1, wherein said injector further comprises a lens interposed between said light source and said injector window.

4. A system as recited by claim 3, wherein said lens has a graded refractive index.

5. A system as recited by claim 1, wherein said detector further comprises an optical filter interposed between said detector window and said light responsive element, said filter preferentially transmitting light of the wavelength emitted by said light source.

6. A system as recited by claim 1, wherein said injector cover and said detector cover are opaque to light of the wavelength emitted by said injector light source.

7. A system as recited by claim 1, said system being a compact, low profile system.

8. A compact, low profile system for measuring the transmission of light between a first optical fiber and a second optical fiber associated therewith, said system comprising:

a) a low profile light injector having an injector base attachable to a substrate, and comprising:

(i) an injector cover, at least a portion of which is movable in a plane parallel to said injector base, said movable portion having an open position and a closed position, the open position permitting insertion of said first fiber into said injector;

(ii) an injector window having an entry face and a concave, arcuate exit face;

(iii) an injector mandrel having a shape complementary to that of said exit face of said injector window, and being biased to clasp a portion of said first optical fiber in intimate contact between said injector mandrel and said exit face of said injector window, said injector mandrel being reversibly retractable from said exit face in response to motion of said injector cover from the closed position to the open position thereof; and

(iv) a light source positioned proximate said entry face of said injector window, whereby light emanating from said source passes through said injector window into said first fiber at said exit face;

b) a low profile light detector having a detector base attachable to said substrate and comprising:

(i) a detector cover, at least a portion of which is movable in a plane parallel to said detector base, said movable portion having

an open position and a closed position, the open position permitting insertion of said second fiber into said detector;

(ii) a detector window having a concave, arcuate entry face and an exit face;

(iii) a detector mandrel having a shape complementary to that of said entry face of said detector window, said detector mandrel being biased to clasp a portion of said second optical fiber in intimate contact between said detector mandrel and said entry face of said detector window, and said detector mandrel being reversibly retractable from said entry face in response to motion of said detector cover from the closed position to the open position thereof; and

(iv) a light responsive element to detect light emerging from said fiber, said light responsive element being positioned proximate said exit face, whereby light emanating from said fiber at said entry face passes through said detector window into said light responsive element; and

c) a driver operably connected to energize said light source; and

d) a receiver for determining the intensity of light incident on said light responsive element.

9. For use in a modular, low profile, fiber optic fusion splicing system, a light injector for injecting light into an optical fiber, said injector having an injector base attachable to a substrate and comprising:

a) an injector window having an entry face and a concave, arcuate exit face;

b) an injector mandrel having a shape complementary to that of said exit face of said injector window, said injector mandrel being biased to clasp a portion of said optical fiber in intimate contact between said injector mandrel and said exit face of said injector window, and said injector mandrel being reversibly retractable from said exit face;

c) a light source positioned proximate said entry face of said injector window, whereby light emanating from said source passes through said injector window into said fiber at said exit face; and

d) said fiber entering said injector in an entry direction and emerging from said injector in an exit direction, said entry and exit directions being substantially parallel, and said fiber traversing a path through said injector in a plane which is substantially parallel to said injector base.

10. A light injector as recited by claim 9, further comprising a lens interposed between said light source and said injector window.

11. A light injector as recited by claim 9, further comprising an injector cover, at least a portion of which is movable in a plane parallel to said injector base, said movable portion having an open position and a closed position, the open position permitting insertion of said fiber into said injector, and said injector mandrel being reversibly retractable from said exit face in response to motion of said injector cover from the closed position to the open position thereof.

12. A light injector as recited by claim 9, wherein said injector cover is opaque to light of the wavelength emitted by said injector light source

13. A light injector as recited by claim 11, wherein said movable portion of said injector cover is rotatably movable between said open position and said closed position

14. A light injector as recited by claim 11, wherein said movable portion of said injector cover is slidably movable between said open position and said closed position.

15. A light injector as recited by claim 11, further comprising a mechanical linkage connecting said mandrel and said movable portion of said injector cover, said mandrel being retracted from said arcuate exit face by motion of said movable portion into said open position.

16. A light injector as recited by claim 9, wherein said biasing of said mandrel comprises attraction of said mandrel to at least one permanent magnet.

17. A light injector as recited by claim 9, wherein said biasing of said mandrel comprises attraction of a ferrous structure attached to said mandrel to at least one permanent magnet.

18. A light injector as recited by claim 9, wherein said biasing of said mandrel comprises application of force to said mandrel by at least one elastically deformable member.

19. A light injector as recited by claim 9, wherein said light source is a light emitting diode.

20. A light injector as recited by claim 9, wherein said light source is a laser.

21. A light injector as recited by claim 9, wherein said light source emits light having a wavelength ranging from about 800 to 900 nm.

22. A light injector as recited by claim 9, wherein said exit face has a radius of curvature of at least about 3 mm.

23. A light injector as recited by claim 22, wherein said exit face has a radius of curvature ranging from about 3 to 4 mm.

24. A light injector as recited by claim 9, wherein said injector window is composed of a material having an index of refraction ranging from about 1.45 to 1.6.

25. For use in a modular, low profile, fiber optic fusion splicing system, a light detector for detecting light emerging from an optical fiber, said detector having a detector base attachable to a substrate and comprising:

a) a detector window having a concave, arcuate entry face and an exit face;

b) a detector mandrel having a shape complementary to that of said entry face of said detector window, said detector mandrel being biased to clasp a portion of said optical fiber in intimate contact between said detector mandrel and said entry face of said detector window, and said detector mandrel being reversibly retractable from said entry face;

c) a light responsive element positioned proximate said exit face of said detector window, whereby light emerging from said fiber at said entry face passes through said detector window and thereafter into said light responsive element; and

d) said fiber entering said detector in an entry direction and emerging from said detector in an exit direction, said entry and exit directions being substantially parallel, and said fiber traversing a path through said detector in a plane which is substantially parallel to said detector base.

26. A light detector as recited by claim 25, further comprising a detector cover, at least a portion of which is movable in a plane parallel to said detector base, said movable portion having an open position and a closed position, the open position permitting insertion of the fiber into said detector, and said detector mandrel being reversibly retractable from said exit face in response to motion of said detector cover from the closed position to the open position thereof.

27. A light detector as recited by claim 26, wherein said detector cover is opaque to light of the wavelength appointed to be detected by said light responsive element.

28. A light detector as recited by claim 26, wherein said movable portion of said detector cover is rotatably movable between said open position and said closed position

29. A light detector as recited by claim 26, wherein said movable portion of said detector cover is slidably movable between said open position and said closed position.

30. A light detector as recited by claim 26, further comprising a mechanical linkage connecting said mandrel and said movable portion of said detector cover, said mandrel being retracted by motion of said movable portion into said open position.

31. A light detector as recited by claim 25, wherein said biasing of said mandrel comprises attraction of said mandrel to at least one permanent magnet.

32. A light detector as recited by claim 25, wherein said biasing of said mandrel comprises attraction of a ferrous structure attached to said mandrel to at least one permanent magnet.

33. A light detector as recited by claim 25, wherein said biasing of said mandrel comprises application of force to said mandrel by at least one elastically deformable member.

34. A light detector as recited by claim 25, wherein said light responsive element is a phototransistor.

35. A light detector as recited by claim 25, wherein said light responsive element is a PIN diode.

36. A light detector as recited by claim 25, wherein said entry face has a radius of curvature of at least about 3 mm.

37. A light detector as recited by claim 36, wherein said entry face has a radius of curvature ranging from about 3 to 4 mm.

38. A light detector as recited by claim 25, wherein said detector window is composed of a material having an index of refraction ranging from about 1.45 to 1.6.

39. A light detector as recited by claim 25, further comprising an optical filter interposed between said detector window and said light responsive element, said filter preferentially transmitting light of a preselected wavelength.

40. A light injector for injecting light into an optical fiber, said injector having an injector base attachable to a substrate and comprising:

a) an injector cover, at least a portion of which is slidably movable in a plane parallel to said injector base, said movable portion having an open position and a closed position, the open position permitting insertion of said first fiber into said injector;

b) an injector window having an entry face and a concave, arcuate exit face;

c) an injector mandrel having a shape complementary to that of said exit face of said injector window, said injector mandrel being biased to clasp a portion of said optical fiber in intimate contact between said injector mandrel and said exit face of said injector window, and said injector mandrel being reversibly retractable from said exit face in response to motion of said injector cover from the closed position to the open position thereof;

d) a light source positioned proximate said entry face of said injector window, whereby light emanating from said source passes through said injector window into said fiber at said exit face; and

e) said fiber entering said injector in an entry direction and emerging from said injector in an exit direction, said entry and exit directions being substantially parallel, and said fiber traversing a path through said injector in a plane which is substantially parallel to said injector base.

41. A light detector for detecting light emerging from an optical fiber, said detector having a detector base attachable to a substrate and comprising:

a) a detector cover, at least a portion of which is slidably movable in a plane parallel to said detector base, said movable portion having an open position and a closed position, the open position permitting insertion of said fiber into said detector;

b) a detector window having a concave, arcuate entry face and an exit face;

c) a detector mandrel having a shape complementary to that of said entry face of said detector window, said detector mandrel being biased to

clasp a portion of said optical fiber in intimate contact between said detector mandrel and said entry face of said detector window, and said detector mandrel being reversibly retractable from said entry face in response to motion of said detector cover from the closed position to the open position thereof;

d) a light responsive element positioned proximate said exit face of said detector window, whereby light emerging from said fiber at said the arcuate entry face passes through said detector window and thereafter into said light responsive element; and

e) said fiber entering said detector in an entry direction and emerging from said detector in an exit direction, said entry and exit directions being substantially parallel, and said fiber traversing a path through said detector in a plane which is substantially parallel to said detector base.

42. A light detector as recited by claim 41, further comprising an optical filter interposed between said detector window and said light responsive element, said filter preferentially transmitting light of a preselected wavelength.

43. A method of assessing the attenuation of light transmitted between a first optical fiber and a second optical fiber associated therewith, the method comprising:

a) providing a compact, low profile, local injection and detection system comprising a light injector and a light detector mounted in a housing in a common plane, wherein each of said light injector and said light detector has a slidably movable cover, each of said covers being

reversibly movable in a direction parallel to said plane to open and close each of said injector and detector;

b) placing the first optical fiber into said light injector and the second optical fiber into said light detector;

c) injecting light into said first optical fiber using said light injector;

d) detecting, using said light detector, the intensity of light transmitted from said first fiber to said second fiber; and

e) inferring the attenuation of light passing from the first fiber to the second fiber from the intensity of light detected by the light detector.

44. A method as recited by claim 43, wherein said first optical fiber enters said local injection and detection system in a direction collinear with the direction in which said second optical fiber exits said local injection and detection system.